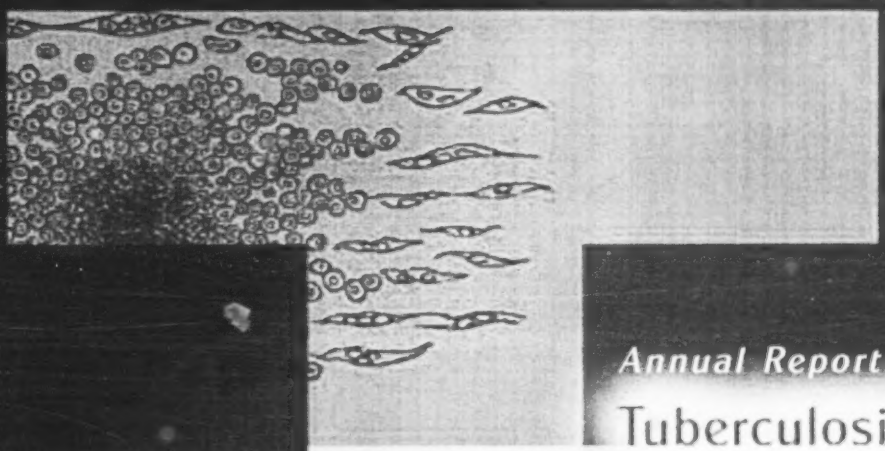
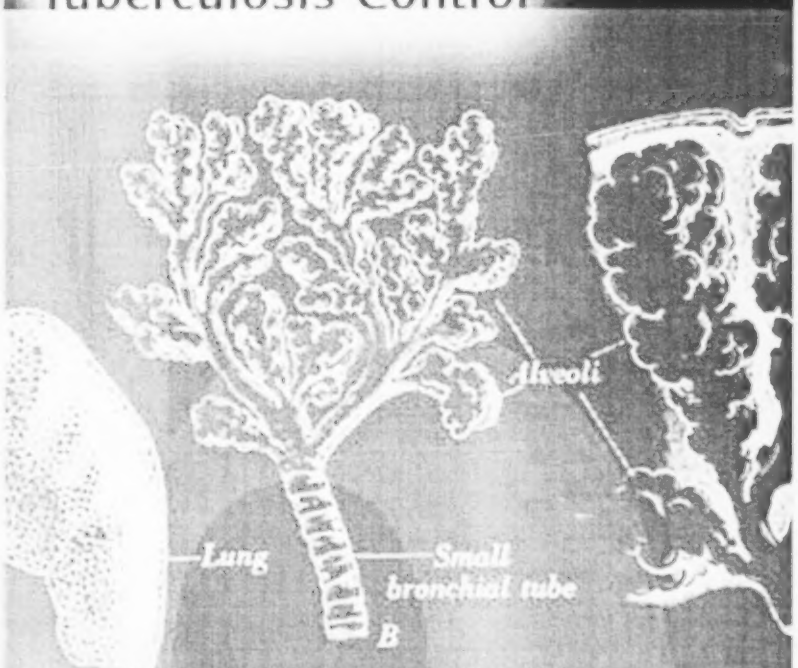


Annual Report 2002

Tuberculosis Control



BC Centre for Disease Control

Excellence Program

2000 Silver Level Recipient

104-05742/

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foreword

Dr. R.K. Elwood, Director

This report presents selected statistical and epidemiological information about tuberculosis (TB) in the province of British Columbia derived from the activities of the Division of Tuberculosis Control, BC Centre for Disease Control for the calendar year 2002.

The information contained in this report is wholly derived from statistics kept by the Registry in the Division of Tuberculosis Control. Tuberculosis control activities in the province of British Columbia are a centralized activity and a nominal registry of all active cases of tuberculosis is maintained in the Division. Although tuberculosis is a notifiable disease, the Division of Tuberculosis Control is informed of cases from several sources including directly from the Laboratory Services of the BC Centre for Disease Control and through Pharmacy Services of BC Centre for Disease Control which is responsible for dispensing all anti-tuberculosis medication throughout the province. These additional reporting mechanisms help to ensure the Division of Tuberculosis Control is advised of all active and suspect tuberculosis treated in the province of British Columbia. The 2002 Annual Report is offered with high degree of confidence in its accuracy.

The care of those on reserve is administered by the Federal Government through First Nations and Inuit Health Branch (FNIHB) who contract with the Division of Tuberculosis Control for this service. All aboriginals living off reserve are the responsibility of the provincial Ministry of Health Services.

The 2002 Annual Report includes details of in-patient treatment of tuberculosis patients which is not directly administered by the Division of Tuberculosis Control. The care of these patients is carried out by TB Ward, Vancouver General Hospital and Health Sciences Centre and is run by the Division of Respiratory Medicine.

TB cases diagnosed between January 1st, 2002 and December 31, 2002 for whom data were entered, up to April 2003, in the database were included in the analysis. Incidence rates (IR) of TB in British Columbia as a whole and in each health region were calculated, as were age specific rates. Population figures were based on the information provided by Statistics Canada (Statistics Canada, Population section, B.C. Stats, Ministry of finance and Corporate Relations).

Dr. R.K. Elwood, M.B., MRCP(UK), FRCP(C)

Provincial Director
Division of Tuberculosis Control

executive summary

Active cases:

In 2002 there were 303 cases of reported tuberculosis in British Columbia (B.C.), a rate of 7.3 per 100,000 a 23% decrease in the number and rate of reported cases compared to 2001.

The rate of tuberculosis in 2001 was the highest since 1997. Part of that increase was artifactual and attributed to a change in the reporting system. After adjusting for these changes, the decline in the incidence rate compared to 2001 is about 16%.

Rates for various health regions vary across the province. The Vancouver, Richmond, North Vancouver Island and Fraser North health service delivery areas have rates exceeding the provincial rate (7.3×10^{-5}). The majority of cases numerically are reported from these Heath Regions (202 cases (67%)). The rates in the Downtown Eastside were 64.2×10^{-5} (85.5×10^{-5} in 2001) and 33.1×10^{-5} (28.2×10^{-5} in 2000) in North East of Vancouver. The rate for the city of Vancouver was 21.8×10^{-5}.

The average age of cases was 51 years. Tuberculosis rate was significantly higher in men than women (8.3 vs 6.4, P-value=0.03). Compared to 2001, there was a greater increase in TB rates among female aged 20-29 and 60-69 years. The age-specific rates show a peak from age 25-39, rising again after age 60.

Rates of tuberculosis among registered aboriginals living on and off reserve remains high at 31.9×10^{-5} (32.2×10^{-5} in 2001). Registered aboriginals living off reserve had the highest incidence rate 43.6×10^{-5} (39.7×10^{-5} in 2001). The highest proportion of HIV infection was observed among aboriginals.

Multiple drug resistance was found in one case originally from India. The commonest single drug resistance was to Isoniazid (3%, n=10).

Eighty seven percent of cases received self-administered treatment. In April 2003, 51% (n=155) of cases diagnosed in 2002 were still on treatment. Excluding those who either died or moved out of province, 95% completed their treatment satisfactorily.

Preventive Therapy:

In 2002, 1144 patients were placed on preventive therapy for latent tuberculosis infection. The completion rate for preventive therapy was just over 52% and there was no difference between self-administered treatment and fully supervised preventive therapy. The commonest causes of non-completion were poor compliance followed by drug reactions.

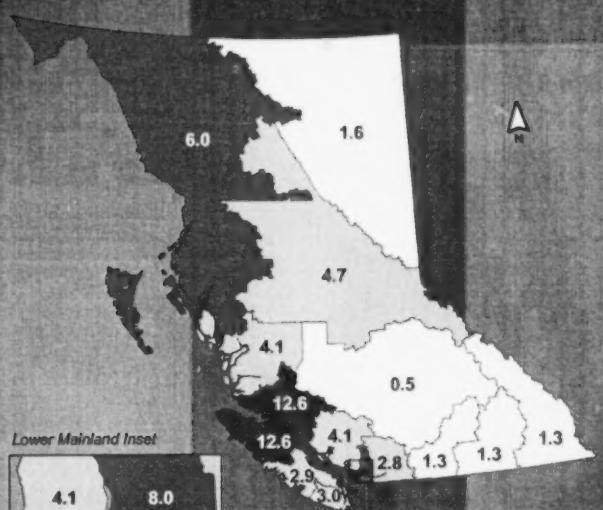
Contacts:

In 2002, 3221 contacts were examined, 592 of whom were household contacts and 2330 were non-household contacts. Further investigation identified 6 active cases among contacts.

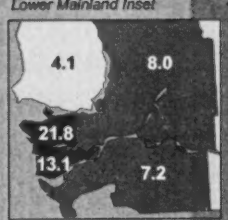
Admission:

During 2002 there were 63 patients admitted to the TB Ward, Vancouver General Hospital and Health Sciences Centre corresponding to 54 admissions and 9 were readmissions. The majority were admitted with suspected tuberculosis.

Tuberculosis Active Cases 2002



Lower Mainland Inset



Rates per 100,000 population by HSDA

0.5 4.7 21.8

1.6 8.0

HSDA	Health Service Delivery Area	Cases	Rate
11	East Kootenay		
12	Kootenay Boundary		
13	Okanagan		
14	Thompson Cariboo Shuswap		
21	Fraser Valley		
22	Simon Fraser		
23	South Fraser		
31	Richmond		
32	Vancouver		
33	North Shore/Coast Garibaldi		
41	South Vancouver Island	12	3.0
42	Central Vancouver Island	7	2.9
43	North Vancouver Island	7	12.6
51	Northwest	5	6.0
52	Northern Interior	7	4.7
53	Northeast	1	1.8

Note: Map classification by Jenks natural breaks method.

R.K. Elwood, M.B., MRCP(UK), FRCP(C)

Provincial Director

Division of Tuberculosis Control

Ramak Shadmani, MD, MSc

Tuberculosis
Active Ca[illegible]12

Rates per 100,000 population by HSDA

0.5 4.7 21.5

1.6 8.0

HSDA	Health Service Delivery Area	Cases	Rate
11	East Kootenay	1	1.3
12	Kootenay Boundary	1	1.3
13	Okanagan	4	1.3
14	Thompson Cariboo Shuswap	1	0.5
21	Fraser Valley	7	2.8
22	Simon Fraser	44	8.0
23	South Fraser	44	7.2
31	Richmond	23	13.1
32	Vancouver	128	21.8
33	North Shore/Coast Garibaldi	11	4.1
41	South Vancouver Island	12	3.0
42	Central Vancouver Island	7	2.9
43	North Vancouver Island	7	12.6
51	Northwest	5	6.0
52	Northern Interior	7	4.7
53	Northeast	1	1.6

Note: Map classification by Jenks natural breaks method.

Incidence rates

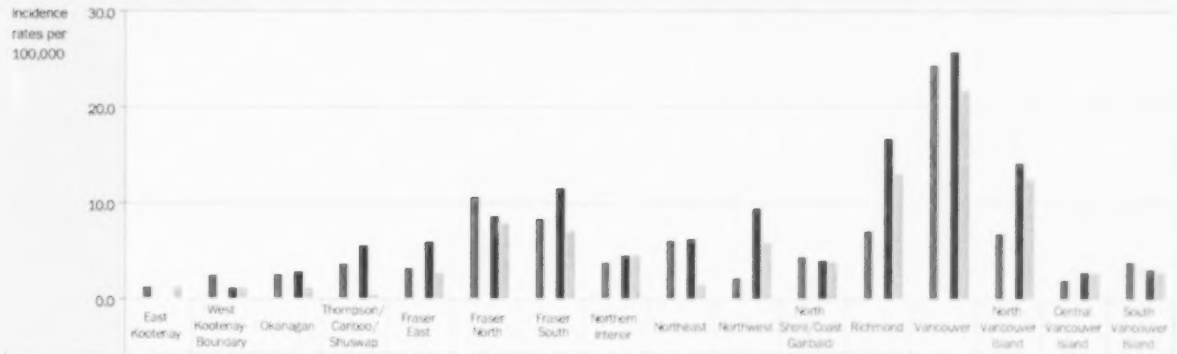
From January 1st, 2002 to 31, December 2002, 303 new cases of TB were diagnosed in B.C. The provincial TB incidence rate was $7.3x10^{-5}$ which represents 23% decrease in the number and rate of reported cases compared to 2001. The rate of tuberculosis in 2001 was the highest since 1997. However, a part of that increase could be attributed to recent changes in the reporting system. After adjusting for these changes, the decline in the incidence rate compared to 2001 is about 16%.

Health regions:

Rates of TB varied considerably among health regions across the province. The Vancouver, Richmond, North Vancouver Island and Fraser North health service delivery areas have rates exceeding the provincial rate ($7.3x10^{-5}$) (Figure 1). The highest incidence rate was observed in Vancouver and Richmond (21.8 and $13.1x10^{-5}$, respectively) while the lowest incidence rates was observed in Interior ($1.0x10^{-5}$).

Forty two percent (n=128) of cases lived in Vancouver and 29% (n=88) in Fraser North or Fraser South. Compared to 2001, the rate of tuberculosis decreased in all regions. The decrease in TB rate was highest for Thompson/Cariboo/Shuswap (5.6 vs 0.5), Fraser South (11.6 vs 7.2), Northeast (6.3 vs 1.6) and Fraser East (6.0 vs 2.8).

Figure 1. Tuberculosis incidence rates per 100,000 by health region, 1999-2002, B.C.



	East Kootenay	West Kootenay-Boundary	Okanagan	Thompson/ Cariboo/ Shuswap	Fraser East	Fraser North	Fraser South	Northern Interior	Northeast	Northwest	North Shore/Coast Garibaldi	Richmond	Vancouver	North Vancouver Island	Central Vancouver Island	South Vancouver Island
TB cases 2002	1.0	1.0	4.0	1.0	7.0	44.0	44.0	7.0	1.0	5.0	11.0	23.0	128.0	7.0	7.0	12.0
TB Rates 1999	1.3	2.5	2.6	3.7	3.3	10.7	8.4	3.9	6.2	2.3	4.5	7.2	24.5	6.9	2.1	4.0
TB Rates 2000	1.3	1.2	1.9	2.8	5.7	7.1	8.5	5.2	0.0	2.3	2.3	15.4	18.6	0.0	3.4	4.3
TB Rates 2001	0.0	1.2	2.9	5.6	6.0	8.7	11.6	4.6	6.3	9.5	4.1	16.8	25.8	14.2	2.9	3.2
TB Rates 2002	1.3	1.3	1.3	0.5	2.8	8.0	7.2	4.7	1.6	6.0	4.1	13.1	21.8	12.6	2.9	3.0

Incidence rates, sub-Vancouver areas

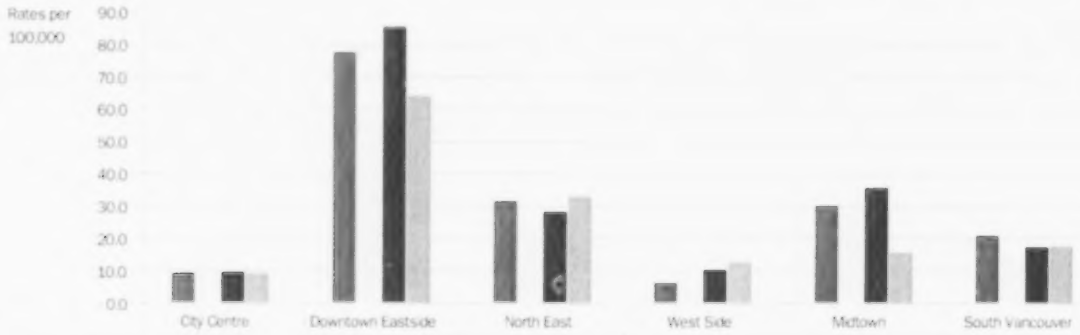
Sub-Vancouver areas:

The incidence rate of TB was 64.2x10-5 in Downtown Eastside a 25% reduction compared to 2001. Among those diagnosed in Vancouver, 52% were diagnosed in Downtown Eastside (n=33) and North East of Vancouver (n=33). Compare to 2001, rate of TB decreased in all sub-Vancouver areas except the North East of Vancouver (Figure 2).

Clinics:

More than half of the cases visited TB Control Vancouver clinic (61%, n=185), 21% (n=63) of cases attended TB Control New Westminster clinic and 4% (n=13) of cases attended Victoria clinic.

Figure 2. Tuberculosis incidence rates per 100,000 in sub-Vancouver areas, 1999-2002, B.C.

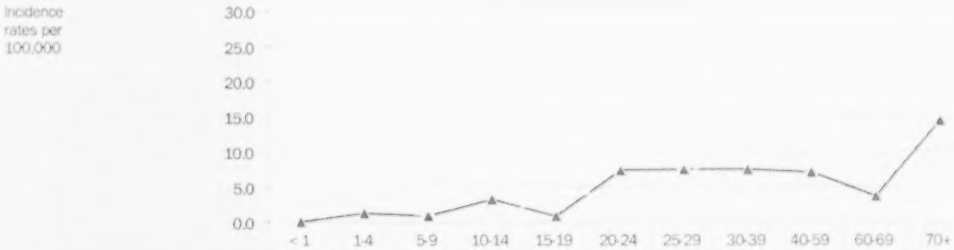


	City Centre	Downtown Eastside	North East	West Side	Midtown	South Vancouver
TB cases 2002	9.0	33.0	33.0	16.0	14.0	23.0
TB rates 1999	9.5	77.7	31.7	6.5	30.4	21.1
TB rates 2000	9.2	58.1	23.0	5.7	23.2	15.2
TB rates 2001	9.6	85.5	28.2	10.4	35.8	17.5
TB rates 2002	9.3	64.2	33.1	12.9	16.0	17.9

General description of active cases

The average age of cases was 51 years (Median=50). Overall, tuberculosis rate was significantly higher in men compared to women (8.3 vs 6.4, P-value=0.03). Compared to 2001, there was a greater increase in TB rates among female aged 20-29 and 60-69 years. The age-specific rates show a peak from age 25-39, rising again after age 60 (Figure 3).

Figure 3. Tuberculosis incidence rates by age and gender. 2002. B.C.



	<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60-69	70+
Tuberculosis cases - female	0.0	1.0	1.0	4.0	1.0	10.0	10.0	24.0	43.0	6.0	33.0
Tuberculosis cases - male	1.0	2.0	1.0	1.0	5.0	6.0	9.0	36.0	45.0	19.0	45.0
TB rates-female	0.0	1.2	0.8	3.1	0.8	7.3	7.4	7.4	7.0	3.6	14.4
TB rates-male	5.0	2.3	0.8	0.7	3.6	4.3	6.6	11.1	7.4	11.7	26.3

Demographics

Sixty seven percent (n=202) of subjects were foreign born and 17% (n=53) were Canadian born, of whom 4 were non-registered aboriginal and 11 belonged to non-white ethnic groups. Eleven percent of cases (n=33) were registered aboriginals of whom 21 were living off reserve and 12 living on reserve. Figure 4 shows that the incidence rate of TB in 2002 was increased only among aboriginals off reserve.

Figure 4. Tuberculosis incidence rates per 100,000, by birthplace and year, B.C.

** Non-registered aboriginal were included.*

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Foreign born	25.9	25.3	26.1	29.1	35.8	25.4	27.2	24.0	29.3	20.0
Canadian born*	2.7	2.7	2.5	1.5	1.8	1.9	2.3	1.8	1.8	1.8
Aboriginal, registered, on reserve	31.9	29.7	21.0	15.3	21.9	23.0	21.2	15.9	24.8	21.7
Aboriginal, registered, off reserve	66.0	69.5	46.1	39.9	48.1	50.2	26.9	26.9	39.7	43.6
Provincial rate (B.C.)	9.6	9.0	8.2	8.4	10.5	8.5	8.3	7.1	9.5	7.3

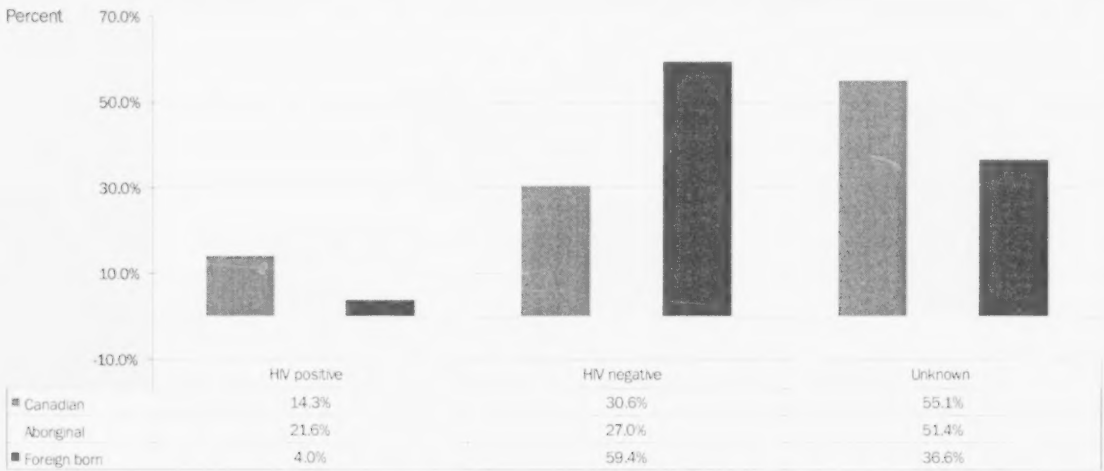
HIV status

HIV status was unknown for 44% (n=133) of active cases. Fourteen percent (n=42) claimed to have been tested and reported negative but laboratory confirmation was not available. One hundred twenty eight (42%) of patients with active disease were tested for HIV infection and 24 (8%) were recorded as positive.

Among subjects 2% (n=7) were classified in the high-risk group for HIV. Among aboriginals 21.6% were HIV positive while this proportion was 4.0% in foreign born and 14.3% in Canadian (Figure 5).

Figure 5. HIV status of tuberculosis cases by birthplace, 2002, B.C.

** In this figure HIV negative is based on laboratory result or by self-reported claim of previous negative test.*



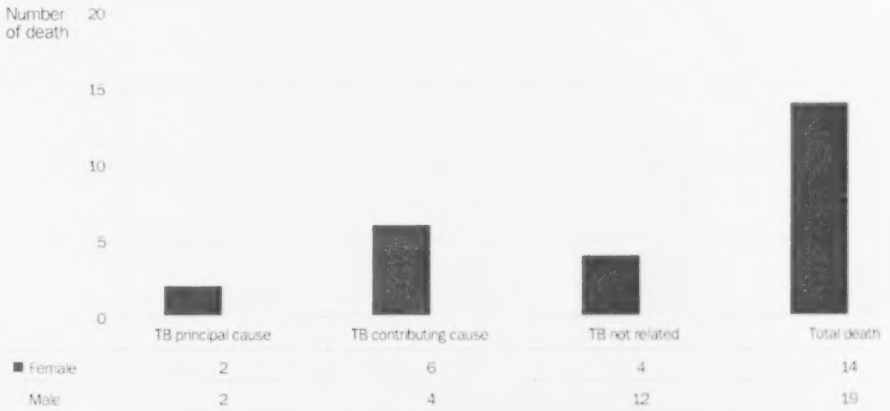
	HIV positive	HIV negative	Unknown
Canadian	14.3%	30.6%	55.1%
Aboriginal	21.6%	27.0%	51.4%
Foreign born	4.0%	59.4%	36.6%

Mortality

Thirty three (11%) cases died during 2002, all of them were 30 years or older (Figure 6). For 4 cases TB was the principal cause of death and for 10 cases TB was a contributing cause of death. Death for 16 cases was considered not to be related to tuberculosis. Four cases were discovered post mortem. The cause of death for 3 cases was not available.

Death due to tuberculosis varied according to the birthplace. For 1.5% of the deaths among foreign born and 9.1% of the deaths among aboriginals, tuberculosis was considered to be the principal or contributing cause of death (Figure 7).

Figure 6. Number of deaths among tuberculosis cases by age, 2002, B.C.



Mortality

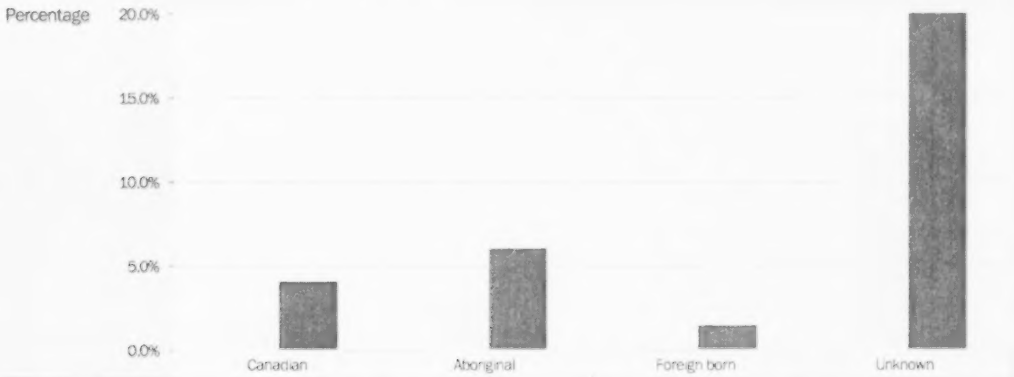
Diagnosis process:

Seventy-eight percent (n=236) of cases were diagnosed after MD referrals, 4% (n=13) because of contact investigation, 8% (n=23) because of immigration surveillance/referral, 7% (n=21) were self-referrals and 3% (n=10) were diagnosed during routine follow up. Eighty-six percent of cases (n=261) were newly diagnosed. One percent (n=3) were diagnosed outside Canada.

Reactivation:

Thirty nine cases (13%) had a reactivation of whom 11 had been treated in B.C. Eight were reactivation of presumed inactive TB (type II reactivation) and 31 were reactivation of previously documented treated TB (type I reactivation). The majority of reactivations were in pulmonary sites (64%, n=25). Most Extrapulmonary reactivations were in lymph nodes (18%, n=7). Two cases with TB reactivation had resistance to TB medications and 2 others had borderline resistance to one of the TB medications.

Figure 7. Death by birthplace, 2002, B.C.



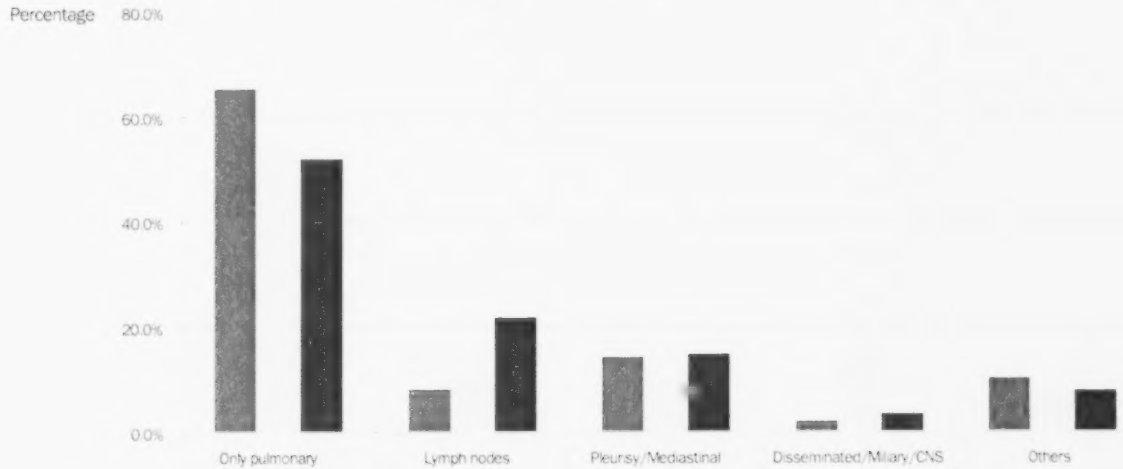
Type of TB

Type of TB

Pulmonary TB was the commonest form of TB (66%, n=199). Isolated pulmonary involvement was observed in 164 cases (54%). Extrapulmonary TB with or without pulmonary involvement accounted for 46% (n=139). Of these 104 (34%) had only extrapulmonary involvement and 35 (12%) had both pulmonary and extrapulmonary involvement. There were 17 cases of disseminated/CNS TB (6%). Most frequent types of extrapulmonary TB were lymph node involvement (38%, n=53). Lymph node involvement was more frequent in foreign born compared to others (Figure 8). Lymph node involvement was found in 21.8% of foreign born compared to 10.8% in aboriginals and 8.2% in Canadians. Disseminated/CNS/Miliary TB was diagnosed more frequently in aboriginals (16.2%) than foreign born (3.5%) or Canadians (2.0%).

Eighty-eight percent (n=267) of cases were bacteriologically confirmed and 36% (n=96) of these were positive on both smear and culture. Non-bacillary status was more frequent in women (11.3%) than in men (2.9%) (p-value=0.003).

Figure 8. Type of TB by birthplace. 2002. B.C.



	Only pulmonary	Lymph nodes	Pleurisy/Mediastinal	Disseminated/Miliary/CNS	Others
Canadian born	65.3%	8.2%	14.3%	2.0%	10.2%
Aboriginal	54.1%	10.8%	10.8%	16.2%	8.1%
Foreign born	52.0%	21.8%	14.9%	3.5%	7.9%

Resistance and treatment

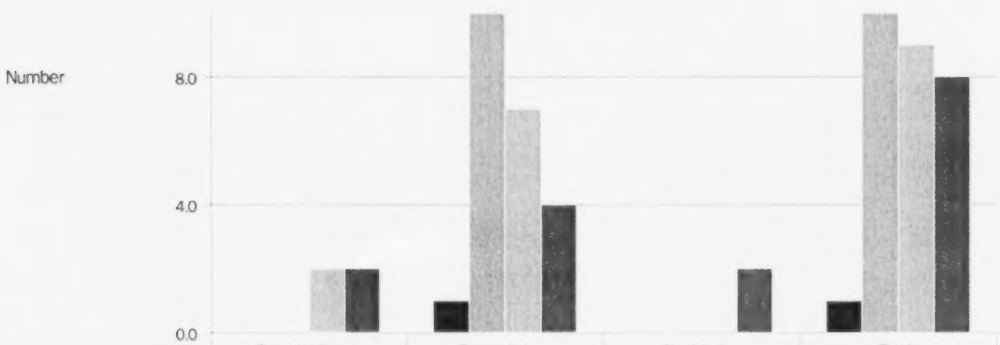
Multiple drug resistance was found in one case, 75 years old, who was originally from India (Figure 9). The commonest single drug resistance was to Isoniazid (3%, n=10). Other type of resistance to TB medications was identified in 3% (n=9) of the cases, all were 30 years old. Borderline resistance to at least one anti-tuberculosis medication was observed in 8 (3%) cases.

Treatment:

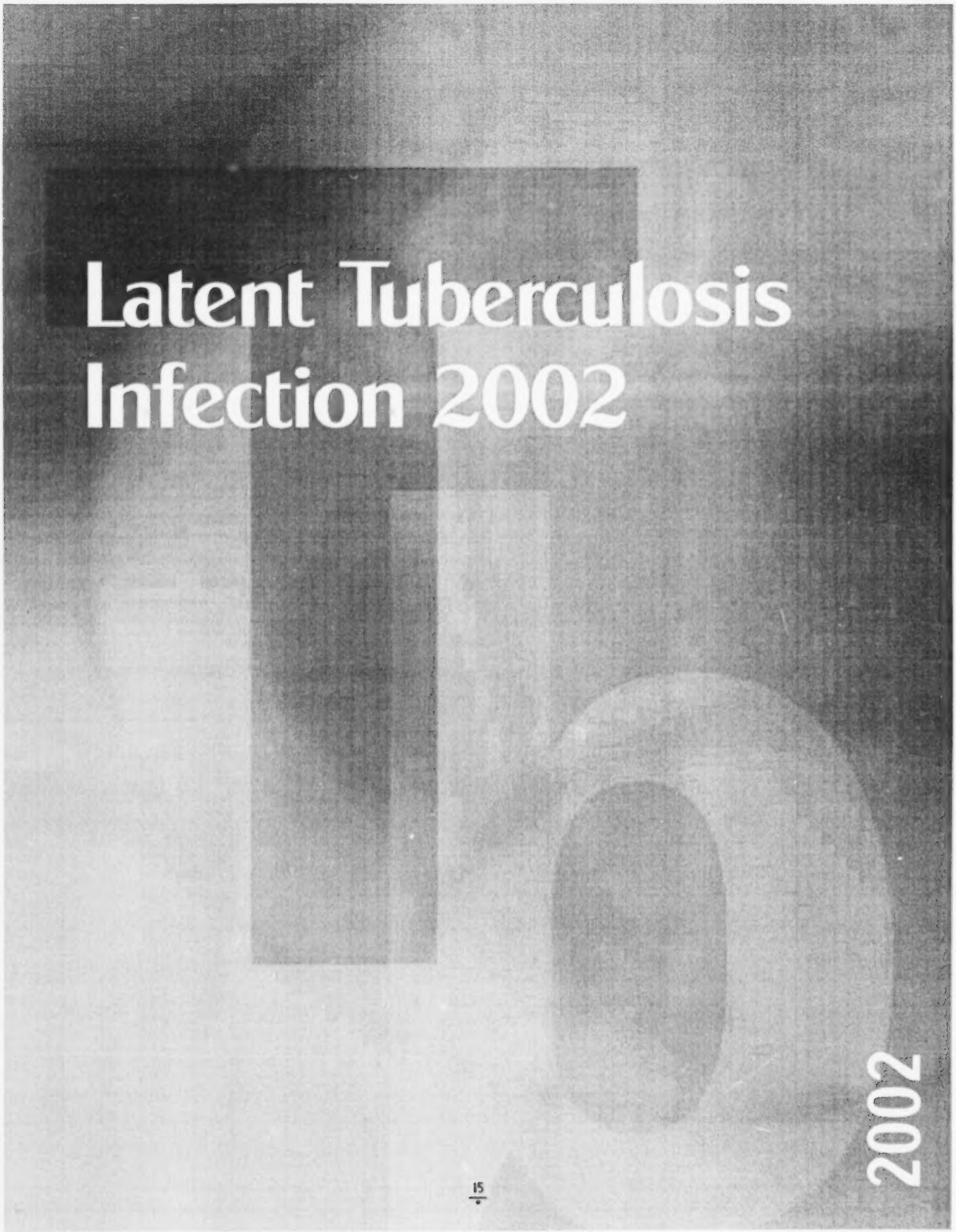
Sixty-four percent (n=194) of cases were treated in the community, 19% (n=58) were treated at the Vancouver General Hospital (VGH) and 10% (n=21) were treated in TB ward. Eighty seven percent of cases (n=265) received self-administered treatment. About 6% (n=19) of cases were placed on directly observed treatment. For 80% (n=241) of cases the prescribed drug regimen included standard treatment for TB (INH, PZA, RM). In April 2003, 51% (n=155) of cases diagnosed in 2002, were still on treatment and 15% (n=46) of cases had discontinued treatment. Excluding those who either died or moved out of province, 95% completed their treatment satisfactorily.

The reasons for stopping treatment, in decreasing order of frequency, were: completion of treatment (34%, n=102), death (11%, n=33) and moving to other provinces (3%, n=8).

Figure 9. Drug resistance by birthplace, 2002, B.C.



	Canadian born	Foregin born	Aboriginal	Total
MDR	0.0	1.0	0.0	1.0
Resistance to INH at least	0.0	10.0	0.0	10.0
Resistance to others	2.0	7.0	0.0	9.0
Only borderline resistance	2.0	4.0	2.0	8.0


Latent Tuberculosis Infection 2002
2002

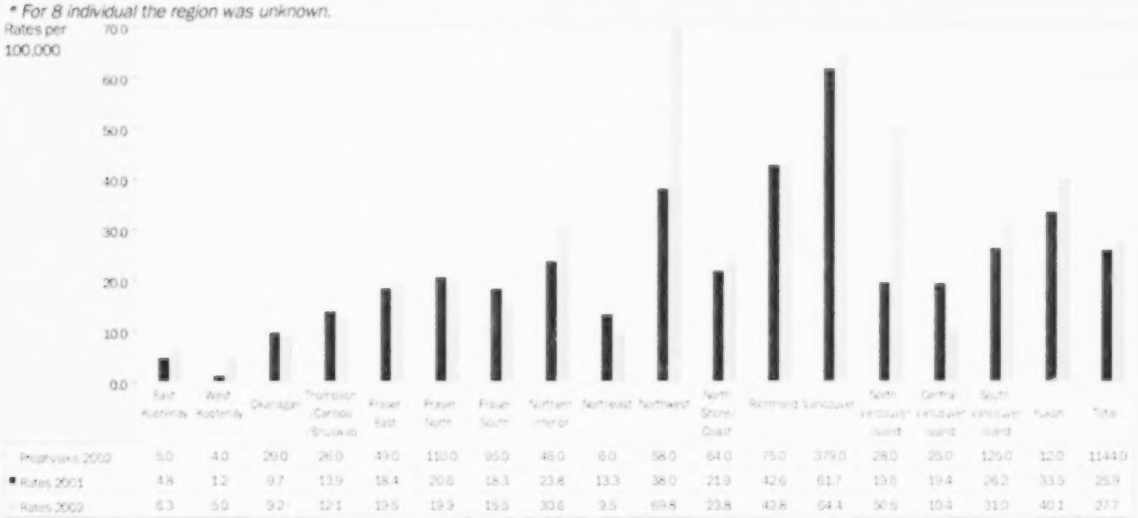
Latent tuberculosis infection

In 2002, 1144 patients were placed on preventive therapy for latent tuberculosis infection. Overall the rate of prophylaxis was 27.7x10^{-5}/year, in British Columbia (Figure 10).

The frequency of prophylaxis was higher in Vancouver health region (33%, n=379) and Simon Fraser (10%, n=110). Compared to 2001, the rate of prophylaxis increased in Northwest and North Vancouver Island.

Figure 10. Rates of preventive therapy per 100,000 by health region, 2001-2002, B.C.

** For 8 individual the region was unknown.*



	East Kootenay	West Kootenay	Okanagan	Thompson Cariboo Shuswap	Fraser East	Fraser North	Fraser South	Northern Interior	Northeast	Northwest	North Shore/ Coast	Richmond	Vancouver	North Vancouver Island	Central Vancouver Island	South Vancouver Island	Yukon	Total
Prophylaxis 2002	5.0	4.0	29.0	26.0	49.0	110.0	95.0	48.0	6.0	58.0	64.0	75.0	379.0	28.0	25.0	125.0	12.0	1144.0
Rates 2001	4.8	1.2	9.7	13.9	18.4	20.6	18.3	23.8	13.3	38.0	21.9	42.6	61.7	13.5	19.4	26.2	33.9	26.9
Rates 2002	5.3	5.0	9.2	12.1	19.5	19.9	15.5	30.6	9.5	69.8	23.8	42.8	64.1	50.5	10.4	31.0	40.1	27.7

Latent tuberculosis infection

In 2002, 1144 patients were placed on preventive therapy for latent tuberculosis infection. Overall the rate of prophylaxis was 27.7x10^{-5}/year, in British Columbia (Figure 10).

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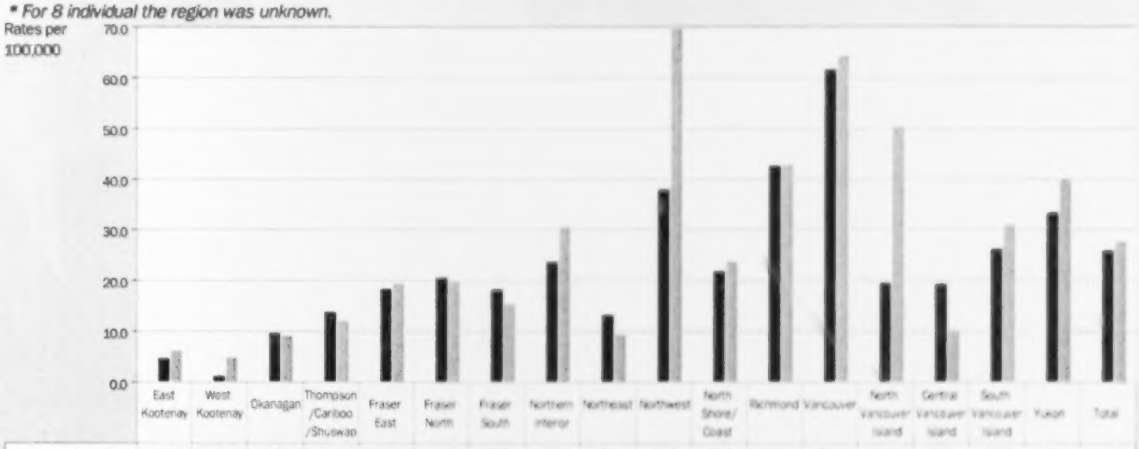
** For 8 individual the region was unknown.*



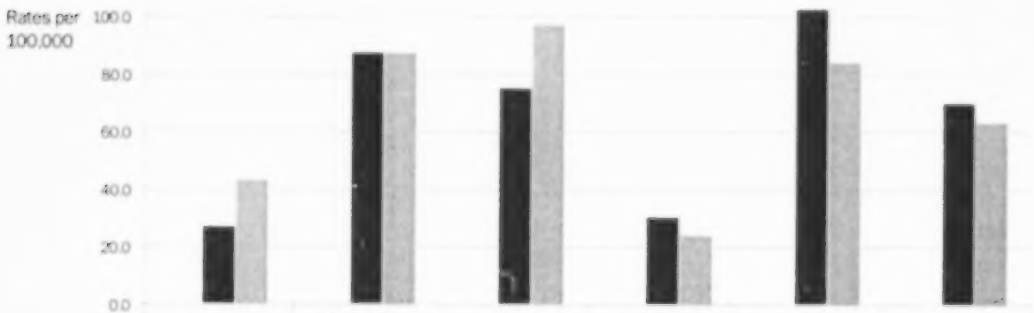
	East Kootenay	West Kootenay	Okanagan	Thompson /Cariboo /Shuswap	Fraser East	Fraser North	Fraser South	Northern Interior	Northeast	Northwest	North Shore/ Coast	Richmond	Vancouver	North Vancouver Island	Central Vancouver Island	South Vancouver Island	Yukon	Total
Prophylaxis 2002	5.0	4.0	29.0	26.0	49.0	110.0	95.0	46.0	6.0	56.0	64.0	75.0	379.0	28.0	25.0	125.0	12.0	1144.0
■ Rates 2001	4.8	1.2	9.7	13.9	18.4	20.6	18.3	23.8	13.3	38.0	21.9	42.6	61.7	19.6	19.4	26.2	33.5	25.9
* Rates 2002	6.3	5.0	9.2	12.1	19.5	19.9	15.5	30.6	9.5	69.8	23.8	42.8	64.4	50.5	10.4	31.0	40.1	27.7

Latent tuberculosis infection

Overall, 379 individuals were put on preventive therapy in Vancouver, for 9 of them data on sub-Vancouver area was missing. North East (26%, n=97), South Vancouver (22%, n=82) and Midtown Vancouver (20%, n=74) included two third of these subjects.

The rate of prophylaxis was 97.4×10^{-5}/year for Vancouver North East, 87.6×10^{-5}/year for Downtown Eastside and 84.4×10^{-5}/year for Vancouver Midtown (Figure 11).

Figure 11. Rates of preventive therapy per 100,000 in sub-Vancouver areas, 2001-2002, B.C.



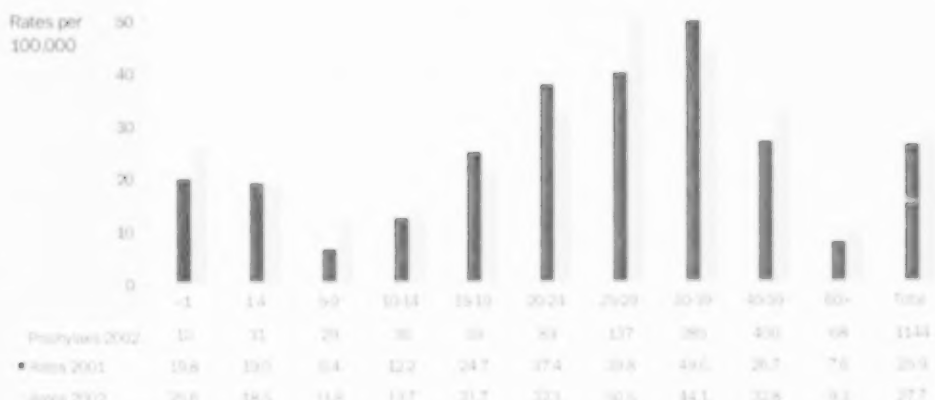
	City Centre	Downtown Eastside	North East	West Side	Midtown	South Vancouver
Prophylaxis 2002	42.0	46.0	97.0	30.0	74.0	62.0
• Rates 2001	26.8	87.4	75.3	30.4	102.7	70.1
◦ Rates 2002	43.2	87.6	97.4	24.2	84.4	63.7

Demographic characteristics

Females represented 58.8% (n=673) of subjects. Rate of prophylaxis was highest among subjects aged 20-29 years old and lowest among those aged 5-9 and 60 years old (50.5 vs 11.8 and 9.3) (Figure 12).

Sixty-five percent (n=739) of subjects were foreign born and 21.4% (n=245) were Canadian born. Registered aborignals accounted for 11.7% (n=134) of subjects. The rate of prophylaxis was estimated to be 129.4×10^{-5}/year for registered aboriginal, 73.2×10^{-5}/year for foreign born and 8.1×10^{-5}/year for Canadian. Based on the laboratory result, 7 subjects were HIV Positive. Canadian. Based on the laboratory result, 1% (n=14) of subjects were HIV Positive.

Figure 12. Rates of preventive therapy per 100,000 by age, 2001-2002, B.C.



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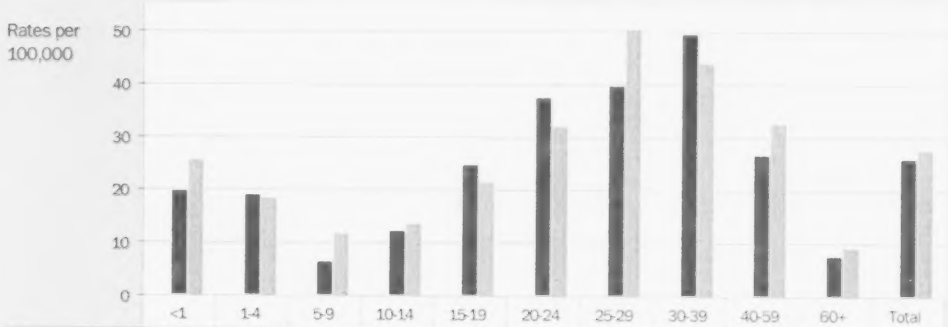


	<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+	Total
Prophylaxis 2002	10	31	29	36	59	89	137	285	400	68	1144
Rates 2001	19.8	19.0	6.4	12.2	24.7	37.4	39.8	49.6	26.7	7.6	25.9
Rates 2002	25.6	18.5	11.8	13.7	21.7	32.1	50.5	44.1	32.8	9.3	27.7

Reasons for prophylaxis and treatment

Reasons for prophylaxis:

The reasons for prophylaxis were: positive tuberculin test 52.9% (n=605), positive tuberculin test and contact with a TB case 29.1% (n=333), radiological evidences of inactive TB 12.6% (n=144). Four percent (n=43) were immunocompromised for various reasons and had a positive tuberculin test. Nineteen (1.8%) individuals were put on treatment for other reasons.

Treatment:

Treatment was administered in outpatient facilities for almost all the subjects (99.5%, n=1138). Among subjects, all but 52 (4.5%) received non-supervised treatment.

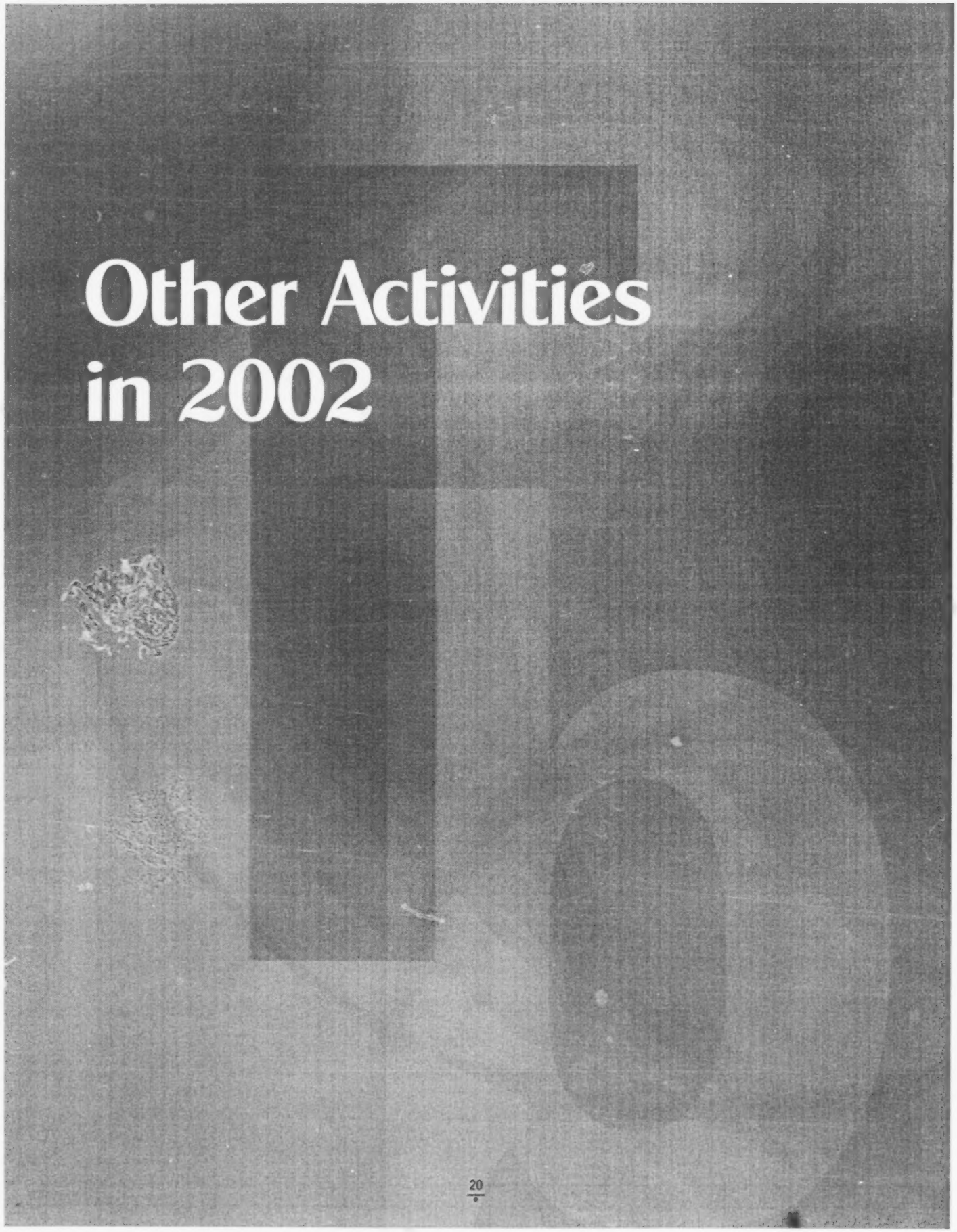
INH, alone or combined with other medications, was prescribed for 95.9% (n=1097) of subjects. RM was prescribed for 4.1% (n=47).

Up to April 2003, 24.9% (n=285) of subjects were still on treatment. Of those who ended (n=859) their treatment, 52.6% (n=452) of subjects completed their treatment satisfactorily.

The commonest causes of non-completion were poor compliance (n=149), drug reaction (n=143) and lost to follow-up (n=31).

Duration of treatment was available for 835 out of 859 cases that ended their treatment. Among them 41% (n=471) were treated for 5 months or more.

Other Activities in 2002



Contact Tracing:

In 2002, 3221 contacts were examined of whom 592 were household and 2330 were non-household contacts. For 299 subjects the type of contact was not available. Among the household contacts, 1 had active tuberculosis and 83 were diagnosed with latent TB and were placed on preventive therapy.

Of non-household contacts, 4 had active TB and 116 were diagnosed with latent TB, and were placed on preventive therapy. Of those with unknown type of contact, one contact had active TB and 8 placed on preventive therapy.

Skin test:

In 2002, 19,001 TB skin tests were preformed in the province. 4292 were positive, 1617 were offered prophylaxis and 814 (50%) accept treatment for latent tuberculosis infection.

BCG vaccination:

Two hundred BCG vaccinations were administered by aboriginal services. Eighty-nine percent (n=175) were 3 months or younger at the time of vaccination. Two adverse reactions were reported which involved lymph node reactions.

Admission:

The designated TB ward is located at Vancouver Health Science Centre, VGH. This ward serves the whole province of B.C. and medical coverage is provided by the UBC Division of Respiratory medicine. In 2002 there were 63 admissions of whom 54 were admitted for the first time in TB ward. Nine individual patients were readmissions. Overall, 7 individuals were admitted twice in 2002. The most frequent discharge diagnoses were suspect TB (51%, n=32), active pulmonary TB (38%, n=24), and active extrapulmonary TB (10%, n=6).

The 63 discharges spent a total of 2410 patient days on the TB ward. Fifty-six percent of patients stayed 1 month and 13% stayed 3 months or more. The average stay was 42 days (Median=30, Range:1 to 175). The majority (75%, n=47) of discharges were on medical advice.

Tuberculosis Services to Registered Aboriginals 2002

Victoria J Cook MD, FRCP(C)

Medical Director

TB services to Aboriginals

Division of Tuberculosis Control

Introduction

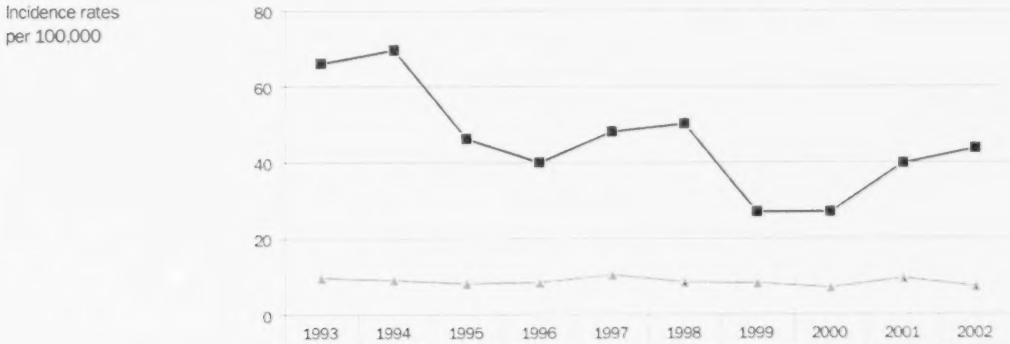
Tuberculosis Services to Aboriginals (TBSA) is the Tuberculosis Control program for Aboriginal persons living on-reserve in British Columbia. This program is administered out of the British Columbia Centre for Disease Control (BCCDC) located in Vancouver, BC. As of July 1st 2003, the position of physician consultant was officially filled by Dr. Victoria Cook. Nursing support continues to be supplied by Shirley Rempel, Shelley Dean and/or Jerry Cyr. The following report includes data extracted as of July 2003 for registered Aboriginal persons, living both on and off-reserve in BC for the year 2002.

Active TB Disease

Incidence:

Between January 1st, 2002 and December 31st, 2002, 33 new cases of active tuberculosis (TB) were diagnosed in Aboriginals, corresponding to an incidence of 31.9 per 100,000. This represents an increase in incidence when compared to 2001 (26.7/100,000) and 2000 (19.9/100,000) (Figure 1).

Figure 1: Incidence rates of active TB in Aboriginals, on and off-reserve, 1993-2002, B.C.



	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Aboriginal, registered, on reserve	31.9	29.7	21	15.3	21.9	22.98	21.2	15.9	24.8	21.7
Aboriginal, registered, off reserve	66	69.5	46.1	39.9	48.1	50.18	26.9	26.9	39.7	43.6
Provincial rate (B.C.)	9.6	9	8.2	8.4	10.5	8.5	8.3	7.1	9.5	7.3

Tuberculosis services to registered Aboriginals 2002

There were 12 cases (36%) of active TB diagnosed in Aboriginals living on-reserve (7 in South Pacific Zone and 5 in North Pacific Zone) with an incidence of 21.7 per 100,000. There were 21 cases (64%) diagnosed in Aboriginals living off-reserve with an incidence of 43.6 per 100,000 (Figure 1). The majority of TB cases off-reserve (76%) were diagnosed in the Vancouver area. Incidence was calculated using population figures from the Registered Indian Population by Sex and Residence 1999, Information Management Branch, Department of Indian Affairs and Northern Development, Minister of Public Works and Government Services of Canada.

Demographics:

Fifty-eight percent and 48% of the cases occurred in females living on-reserve and off-reserve, respectively. There were no active TB cases diagnosed under the age of 5 years. The majority of on-reserve cases (75%) were diagnosed in patients greater than 40 years of age, while 62% of off-reserve cases were diagnosed between the ages of 30 to 59. The mean age of cases was 42 years, median 40 years and range from 7 to 83 years of age.

Site of Disease and HIV status:

There was 18 cases (55%) of pulmonary TB, 11 cases (33%) of extra-pulmonary TB and 4 cases of both pulmonary and extra-pulmonary disease. There were 2 diagnoses of primary pulmonary TB disease. There were no cases of tuberculous meningitis and 6 cases of miliary/disseminated TB. Of the 33 cases of active TB, 8 had HIV co-infection.

Laboratory and Treatment:

Culture and sensitivity results were available for 29 cases (89%) and the majority (93%) of these isolates were sensitive to all first-line anti-tuberculous medications. Of all patients treated (n=30), a minority (23%) received supervised or Directly Observed Therapy (DOT) treatment. As of July 2003, 10 cases had successfully completed treatment and TB was the principal cause of death for 1 case.

Contact Investigations:

Six hundred and eighty-seven contacts were identified through contact investigation of active TB cases. Of all Aboriginal contacts screened, 51% of the screening activities occurred on-reserve. There were 64 household, 248 close/non-household and 314 casual contacts screened. The type of contact was not listed for 48 individuals. There were 13 contacts screened within a correctional facility.

Tuberculin Skin Testing:

Tuberculin skin testing (TST) was completed in 3281 registered aboriginals during 2002. Seventy-six percent (n=2512) of the skin testing was performed on-reserve. Of all TST planted, 16% (n=540) were read as positive. Thirty-five percent and 15% of TSTs were documented positive off-reserve and on-reserve, respectively.

Latent Tuberculosis Infection (LTBI):

Isoniazid (INH) treatment of LTBI was offered to 248 Aboriginal persons (46% of those with a positive TST). The majority offered INH treatment (86%) lived on-reserve. Of those offered INH, 42% (n=106) accepted the 9 month course of treatment and as of July 2003, 64 cases had completed treatment.

BCG Vaccination Program:

Two hundred BCG vaccinations were given to Aboriginal infants living on-reserve in BC. BCG vaccinations were provided to 149 infants less than or equal to 3 months of age and 20 children greater than 1 year old. Age data was missing for 4 persons.

Discussion

Tuberculosis remains a significant public health problem for Aboriginal persons living on and off-reserve in BC. Rates of active TB disease for 2002 have increased compared to 2001. It is important to note that disease rates in many communities vary from year to year and data from a single year may not predict a coming trend. However, Aboriginal people have shown high rates of clustering of TB cases reflecting active transmission and a recent report on the increased risk of HIV infection among high-risk Aboriginal communities in Canada suggests that the potential impact of HIV on TB transmission in this community has yet to be realized. For these reasons, the prompt diagnosis and appropriate management of active TB disease in Aboriginal persons remains the cornerstone of TB Control. It should be noted that Directly Observed Therapy (DOT) is recommended for all cases of active TB disease and where possible for treatment of LTBI. Incentives are available for children taking medication by DOT either for treatment of active TB disease or LTBI.

We remain concerned about the number of Aboriginal persons completing INH treatment for LTBI. Recent published data on the interpretation of TB skin tests in patients with previous BCG vaccination, as well changes to international standard guidelines for those persons considered eligible for INH treatment, have lead to more aggressive diagnosis and management of LTBI. These increased efforts will hopefully ensure that all Aboriginal persons with LTBI who could potentially benefit from treatment are identified and offered this option.

In response to concerns regarding community participation in TB skin test (TST) surveys, the "Aboriginal Tuberculosis Education Program" based upon a train-the-trainer model was initiated and implemented in collaboration with Dr. Patrick McGowan of the Institute of Health Promotion at UBC. Data collection is complete and upon initial analysis it appears that lay educators did not influence TST participation rates or acceptance of INH. However, it was encouraging to note that once INH treatment was offered and accepted, completion rates were excellent in the Aboriginal communities. In an ongoing evaluation, we will be conducting telephone interviews with participating community members to identify why persons with a positive TST did or did not accept INH treatment.

Discontinuation of BCG Vaccination

There has been much discussion recently regarding the role of Bacille Calmette-Guerin (BCG) vaccination in Canada. BCG vaccination has been recommended in Canada as an effective preventative measure in Aboriginal communities for over 40 years. However, the vaccine remains controversial due to questions of efficacy and side effects varying from local adverse reactions to disseminated BCG infection. Canadian experts have completed their review of our national BCG vaccination policy with the decision to support vaccine discontinuation. In May 2003, a letter was distributed to the Chiefs by Dr. Jay Wortman, Regional Director of the First Nations and Inuit Health Branch (FNIHB), informing Aboriginal communities of the discontinuation of the BCG vaccination program in BC. While this decision has not effected the data collected for this report, enhanced surveillance activities in all Aboriginal communities will be the focus of TB Control efforts during this period of transition. It will be critical to increase surveillance of children † 5 years of age, due to the risk of severe forms of TB in this age group. As well, increased surveillance of high-risk populations will be necessary to reduce the presence of undiagnosed infectious disease that children could be exposed to.

Other plans:

1) Program Policy Manual Update:

A TB Program Policy Manual is printed and posted free of charge to all Health Centers. This manual is undergoing revision to accurately reflect the current activities of the Aboriginal TB Control program and will be available in the Fall of 2003.

2) Children's Video:

There are currently limited resources available for educating children about TB. Children encompass a significant proportion of the population targeted for TST screening and treatment of LTBI. CHNs in the field have requested a video for use with teaching children in the schools, especially around times when TST screening occurs. A draft film proposal has been prepared and further development is dependant upon budgetary issues.

3) Scrap-TB:

Scrap-TB is a national tuberculosis elimination strategy for Aboriginal peoples of Canada that will be used in British Columbia to better understand TB related community risk and plan TB programming in Aboriginal communities. The selection of a pilot community is underway and program implementation is scheduled for the fall 2003.

Acknowledgements

We would like to thank Shirley Rempel, Shelley Dean and Jerry Cyr for providing excellent nursing support to TBSA, as well as Valerie Lee for data entry. Thanks is also given to Liz Lange for her administrative support as well as to all the CHNs, CHRs and other health care workers for their efforts during the past year.

It is with regret that I must mention the sudden passing of Ms. Kathy McDaniel. Kathy worked with TB Control for over 20 years, and was an administrative assistant with the TBSA program providing a decade of exceptional service. She is missed by her colleagues and friends at TB Control.

Research, Publications and Presentations

Publications:

Wang L, Turner MO, Elwood RK, Schulzer M, FitzGerald JM. A meta-analysis of the effect of Bacille Calmette Guerin vaccination on tuberculin skin test measurements. *Thorax. 2002;57:804-809*

Hernandez-Garduno E, Kunimoto D, Wang L et al. Predictors of clustering of tuberculosis in Greater Vancouver: a molecular epidemiology study. *CMAJ 2002;167:349-352*

Elwood, R.K., Opazo, A., Lentini, V., Shadmani, R., Incidence of Pulmonary Disease caused by Mycobacteria other than Tuberculosis in British Columbia. *Can Resp J: 2002: 9(5):319-323.*

Submissions:

Cook VJ, Hernandez-Garduno E, Kunimoto D, Hershfield ES, Fanning A, Hoeppner VH, Elwood RK, FitzGerald JM and the Canadian Molecular Epidemiology of Tuberculosis Study Group. Influence of BCG Vaccination on Tuberculosis Transmission in Aboriginal Communities of Western Canada (1995-1997). *Submitted to Int J Tuberc Lung Dis, June 2003.*

Cook VJ, McGowan P, Shadmani R and FitzGerald JM. Train the Trainer: The impact of education of participation rates in tuberculin skin testing surveys in Aboriginal communities. *Plans for manuscript submission.*

Presentations:

Evaluation of two years of community skin testing surveys in Aboriginal communities on reserve in British Columbia. Rempel S, Dean S, Breton N, Elwood RK, Shadmani R IUALTD Conference, Vancouver, March 2002.

Beyond directly observed therapy: Do social interactions increase tuberculosis medication compliance and decrease outreach visits? Dean S, Cyr J, Dhalla N, Breton N, Elwood RK, Shadmani R, Der M, McArthur M. IUALTD Conference, Vancouver, March 2002.

Appendix 2001

Active cases demographics

Demographic characteristics of active cases by age, 2002, B.C.

Age group Number of cases	< 1 n=0	1-4 n=3	5-9 n=2	10-14 n=5	15-19 n=6	20-24 n=16	25-29 n=19	30-39 n=60	40-59 n=88	60+ n=104	Total N=303
TB Cases – Female	0	1	1	4	1	10	10	24	43	39	133
TB Cases – Male	0	2	1	1	5	6	9	36	45	65	170
Female											
Total death	0	0	0	0	0	0	0	2	5	7	14
TB princip	0	0	0	0	0	0	0	1	1	0	2
TB contributing	0	0	0	0	0	0	0	0	2	4	6
Male											
Total death	0	0	0	0	0	0	0	2	5	12	19
TB principal	0	0	0	0	0	0	0	1	1	0	2
TB contributing	0	0	0	0	0	0	0	1	1	2	4

Bacillary status and type of TB

Age group Number of cases	< 1 n=0	1-4 n=3	5-9 n=2	10-14 n=5	15-19 n=6	20-24 n=16	25-29 n=19	30-39 n=60	40-59 n=88	60+ n=104	Total N=303
Gender											
Female	0	1	1	4	1	10	10	24	43	39	133
Bacillary	0	0	0	2	0	9	9	22	33	34	109
Unknown	0	1	1	1	0	1	1	0	4	0	9
Male	0	2	1	1	5	6	9	36	45	65	170
Bacillary	0	0	0	1	5	5	8	34	42	63	158
Unknown	0	2	1	0	0	0	0	2	1	1	7
Type of TB											
Pulmonary	0	3	2	4	1	8	6	27	47	66	164
Extrapulmonary	0	0	0	1	4	6	10	24	33	26	104
Both	0	0	0	0	1	2	3	9	8	12	35
Extra-pulmonary											
Lymph nodes	0	0	0	1	4	3	6	12	20	7	53
Pleurisy/Mediastinal	0	0	0	0	1	3	6	8	9	15	42
Disseminated/ miliary/CNS	0	0	0	0	0	0	0	6	1	5	17
Bones and Joints	0	0	0	0	0	0	0	1	1	7	9
Peritonium/GIT	0	0	0	0	0	0	0	3	1	2	6
GUT	0	0	0	0	0	1	0	1	1	1	4
Eye/Ear/Skin/Other	0	0	0	0	0	1	1	2	3	1	8

HIV status and death

HIV status, drug resistance and reactivation by age, active cases, 2002, B.C.

Age group Number of cases	< 1 n=0	1-4 n=2	5-9 n=3	10-14 n=5	15-19 n=6	20-24 n=16	25-29 n=19	30-39 n=60	40-59 n=88	60+ n=104	Total n=303
HIV positive	0	0	1	0	0	0	3	9	10	1	24
Claimed HIV negative	0	1	0	1	1	3	1	5	10	20	42
HIV negative	0	0	0	3	4	7	10	17	31	32	104
Unknown	0	2	1	1	1	6	5	29	37	51	133
MDR	0	0	0	0	0	0	0	0	0	1	1
Resistant to INH alone or with others (not RM)	0	0	0	0	0	1	2	3	2	2	10
Other resistance combination	0	0	0	0	0	0	0	5	1	3	9
Borderline resistance	0	0	0	1	0	1	0	3	2	1	8
New cases	0	2	2	5	5	15	17	56	77	82	261
Reactivation I	0	0	0	0	1	1	1	3	9	16	31
Reactivation II	0	0	0	0	0	0	1	1	1	5	8
Diagnosed outside Canada	0	1	0	0	0	0	0	0	1	1	3

Active cases by birthplace

Birthplace by age, 2002, B.C.

Age group Number of cases	< 1 n=0	1-4 n=3	5-9 n=2	10-14 n=5	15-19 n=6	20-24 n=16	25-29 n=19	30-39 n=60	40-59 n=88	60+ n=104	Total N=303
Foreign born	0	1	1	2	5	12	14	34	55	78	202
Canadian	0	2	0	1	1	1	2	14	16	12	49
White	0	0	0	0	0	0	0	13	16	9	38
Others	0	2	0	1	1	1	2	1	0	3	11
Aboriginal	0	0	1	2	0	3	3	9	13	6	37
Registered	0	0	1	2	0	3	3	8	11	5	33
On reserve	0	0	1	1	0	0	0	1	5	4	12
Off reserve	0	0	0	1	0	3	3	7	6	1	21
Non registered*	0	0	0	0	0	0	0	1	2	1	4
Unknown	0	0	0	0	0	0	0	3	4	8	15

** Metis are included.*

HIV status and death by birthplace, 2002, B.C

	Canadian n=49	Registered aboriginal n=33	Non-registered aboriginal n=4	Foreign born n=202	Unknown n=15	Total n=303
HIV positive	7	8	0	8	1	24
Claimed HIV-	8	3	1	29	1	42
HIV negative	7	5	1	91	0	104
Unknown	27	17	2	74	13	133
Death	6	8	0	9	10	33
TB principal	1	1	0	0	2	4 *
TB contributing	2	2	0	3	3	10 **
TB not related	2	5	0	5	4	16 ¶
Unknown	1	0	0	1	1	3

** Among them 0 were notified after death.*

*** Of them 1 was notified after death.*

¶ Of them 3 were notified after death.

Resistance and case category

Resistance to anti TB medication by birthplace, 2002, B.C.

	Canadian n=49	Aboriginal registered n=33	Aboriginal non-registered n=4	Foreign born n=202	Unknown n=15	Total N=303
MDR	0	0	0	1	0	1
Resistant to INH alone or with others (not RM)	0	0	0	10	0	10
Other resistance combination	2	0	0	7	0	9
Borderline resistance	2	2	0	4	0	8
Total	4	2	0	22	0	28

Case category by finding on x-ray, 2002, B.C.

	New n=261	Reactivation I n=31	Reactivation II n=8	Diagnosed outside Canada n=3	Total N=303
Normal x-ray	30	0	0	1	31
No previous x-ray	206	2	0	2	210
Inactive TB	0	27	0	0	27
Presumed inactive TB	8	0	7	0	15
Old pleurisy	2	0	0	0	2
Healed primary complex	0	1	0	0	1
Solid lung density	1	0	0	0	1
Others	14	1	1	0	16

Type of Tuberculosis by birthplace

	Canadian n=49	Aboriginal registered n=33	Aboriginal non-registered n=4	Foreign born n=202	Unknown n=15	Total N=303
Type of TB						
Pulmonary	32	18	2	105	7	164
Extrapulmonary	12	11	2	73	6	104
Both	5	4	0	24	2	35
Extra-pulmonary						
Lymph nodes	4	4	0	44	1	53
Pleurisy/Mediastinal	7	4	0	30	1	42
Disseminated/miliary/CNS	1	6	0	7	3	17
Bones & Joints	1	0	1	5	2	9
Peritonium/GIT	0	0	0	5	1	6
GUT	1	0	1	2	0	4
Eye/Ear/Skin/Other	3	1	0	4	0	8

Type of Tuberculosis

Positive laboratory result by type of TB, 2002, B.C.

	Positive laboratory result					Death	
	Only smear	Only culture	Smear and culture	Histology or pathology	Unknown	Principal cause	Contributing cause
Pulmonary	2	77	66	0	10	2	6
Lymph nodes	4	35	8	3	1	0	0
Pleurisy/Mediastinal	0	23	8	4	3	0	1
Disseminated/miliary/CNS	0	7	10	0	0	2	2
Bones and Joints	0	7	2	0	0	0	0
Peritonium/GIT	0	2	1	0	0	0	1
GUT	0	3	1	0	0	0	0
Eye/Ear/Skin/Other	0	1	0	3	2	0	0

Place of treatment

Place of treatment by type of TB and laboratory result, 2001, B.C.

	Domiciliary	Hospital, TB ward	General hospital	Ex-province	Deceased	Unknown	Total
Pulmonary							
Non bacillary	8	0	1	0	0	0	9
Only smear+	1	0	1	0	0	0	2
Smear&Culture+	34	11	19	1	1	0	66
Only culture+	58	2	7	5	5	0	77
Histology+	0	0	0	0	0	0	0
Unknown	3	1	1	5	0	0	10
Pathology+	0	0	0	0	0	0	0
Total	104	14	29	11	6	0	164
Extrapulmonary							
Non bacillary	9	0	1	1	0	0	11
Only smear+	3	0	0	0	0	0	3
Smear&Culture+	7	2	4	0	3	0	16
Only culture+	43	0	10	1	2	3	59
Histology+	0	0	0	0	0	0	0
Unknown	6	0	0	0	0	0	6
Pathology+	4	0	2	3	0	0	9
Total	72	2	17	5	5	3	104
Both							
Non bacillary	0	0	0	0	0	0	0
Only smear+	0	1	0	0	0	0	1
Smear&Culture+	5	3	6	0	0	0	14
Only culture+	12	1	6	0	0	0	19
Histology+	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0
Pathology+	1	0	0	0	0	0	1
Total	18	5	12	0	0	0	35

Contact tracing

Outcomes of contact tracing by the type of TB and bacillary status of the source case and the type of contact. 2002. B.C.

	Type of TB in source case and type of contact								
	Pulmonary			Extrapulmonary			Unknown		
Bacillary status of the source case	Household n=391	Close non household n=1430	Unknown n=218	Household n=87	Close non-household n=411	Unknown n=20	Household n=114	Close non-household n=489	Unknown n=61
Positive smear	196	1024	178	28	378	14	35	183	19
TBN positive	64	210	15	11	42	0	14	25	3
Active	0	4	1	0	0	0	0	0	0
Prophylaxis	32	68	4	7	14	0	6	2	0
Positive only in culture	179	338	38	49	19	4	36	254	11
TBN positive	54	62	8	17	4	0	8	47	5
Active	0	0	0	0	0	0	1	0	0
Prophylaxis	23	16	2	5	3	0	5	7	0
Pathology positive/ Histology positive	0	0	0	1	0	0	0	0	0
TBN positive	0	0	0	0	0	0	0	0	0
Active	0	0	0	0	0	0	0	0	0
Prophylaxis	0	0	0	0	0	0	0	0	0
Non-bacillary	10	61	0	7	3	0	0	0	0
TBN positive	4	13	0	0	0	0	0	0	0
Active	0	0	0	0	0	0	0	0	0
Prophylaxis	2	3	0	0	0	0	0	0	0
Unknown	6	7	2	2	11	2	43	52	31
TBN positive	0	0	0	1	1	1	10	9	2
Active	0	0	0	0	0	0	0	0	0
Prophylaxis	0	0	0	0	1	1	3	2	1

Admission

Tuberculosis admission by the duration of stay (month), 2002, B.C.

	Duration of stay (month)								
	0-1 n=35	1-2 n=11	2-3 n=9	3-4 n=3	4-5 n=3	5-6 n=1	6+ n=0	Unknown n=0	Total N=63
Active Pulmonary	15	2	6	1	0	0	0	0	24
Active extra-pulmonary	3	1	2	0	0	0	0	0	6
Suspect	17	8	1	2	3	1	0	0	32
MOTT	0	0	0	0	0	0	0	0	0
Other	0	0	0	1	0	0	0	0	1

Contact information

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